

# Standard Operating Procedure (SOP) for MTS Single Acting Frame With UniTest Control

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## Safety{tc \11 "Safety}

Materials testing systems are potentially dangerous, therefore observance of the following safety precautions and awareness of the possible dangers is essential.

### **Operator Safety**

Carefully read instructions and operation manuals; observe all WARNINGS and CAUTIONS. Common sense and good judgement are the best safety precautions.

### **General Safety**

**WARNING: DISCONNECT ALL POWER BEFORE REMOVING COVERS FOR TROUBLESHOOTING PURPOSES.**

**WARNING: NEVER PLACE BODY PARTS BETWEEN POTENTIAL PINCH POINTS WITHOUT FIRST DE-ENERGIZING THE HYDRAULIC POWER SUPPLY AND ENGAGING EMERGENCY STOP BUTTON.**

**WARNING: ALWAYS DE-ENERGIZE THE HYDRAULIC POWER SUPPLY AND ENGAGE EMERGENCY STOP BUTTON BEFORE INSTALLING OR REMOVING TOOLING.**

## 1.0 Start up procedure for MTS single acting frame with UniTest control

{tc \11 "1.0 System Introduction}

1. The main power disconnects on the following panels should be in the ON position before using the system. These should be powered up BEFORE starting the UniTest software.
  - Main Power Panel 1 (labeled “Fed from Panel B, Breaker 24 A”) located to the left of the load frame – Always ON for normal system operation (Figure 1).



**Figure 1** – Main Power Panel 1 (located to the left of the load frame).

- Main Power Panel 2 (labeled “Fed from Panel B, Breaker 24 B”) located to the left of the load frame and under Main Power Panel 1 – Always ON for normal system operation (Figure 2).



**Figure 2** – Main Power Panel 2 (located to the left of the load frame and under Main Power Panel 1).

- The main power disconnect switch for the pump is located on the wall behind the load frame. This switch should be ON for normal system operation (Figure 3).



**Figure 3** – Main power disconnect switch for pump (located on the wall behind the load frame).

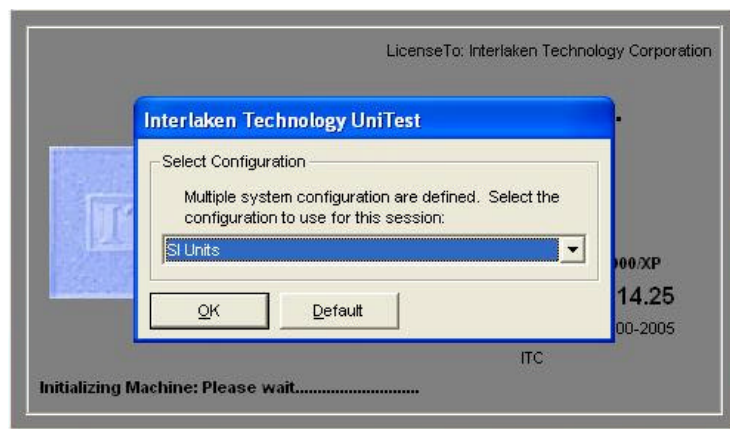
- Press the START button on the Hydraulic Power Supply (HPS) Power Panel.

This panel is located behind and to the left of the load frame (Figure 4).



**Figure 4** – Hydraulic Power Supply (HPS) Power Panel (located behind and to the left of the load frame).

2. Turn on the computer to start the UniTest program. The computer for controlling the movement of the actuators is located to the left of the load frame.
3. The UniTest program is initiated by double clicking on the “UniTest” icon on the Windows desktop. This will bring up the “Select Configuration” dialogue box (Figure 5).



**Figure 5** – Select Configuration dialogue box.

4. In the “Select Configuration” dialogue box, the user is able to select the units to be used from the drop down menu (i.e. SI, Standard). Click OK once the units selection is made.

5. The UniTest Main Panel will then appear on the screen (Figure 6).

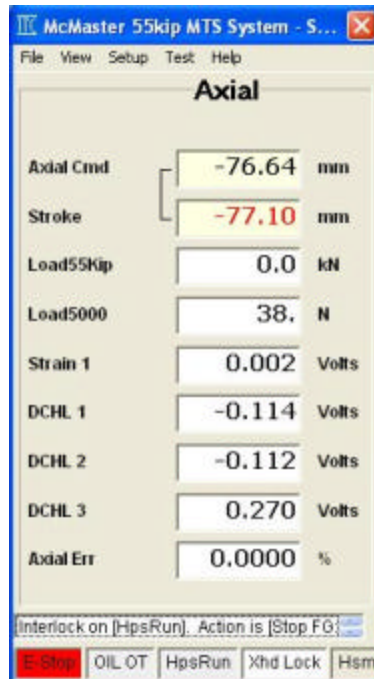


Figure 6 – UniTest Main Panel.

{tc \12 "Configuration Selection Menu}

6. To start the Hydraulic Power Supply (HPS), select “Setup” on the top of the UniTest Main Panel (Figure 6). Select “Hydraulics” from the drop down menu and the Hydraulics menu will open (Figure 7).

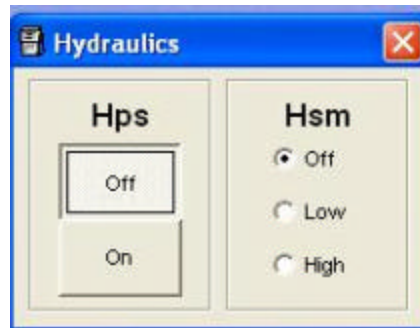


Figure 7 – Hydraulics menu.

7. In the Hydraulics menu (Figure 7), selecting the On or Off box will turn the hydraulics on or off respectively.

- 8. To manually position the actuators, select "Setup" on the top of the UniTest Main Panel (Figure 6). Select "Servo Command" from the drop down menu, and then select "Axial". This will open the Change Command menu (Figure 8).

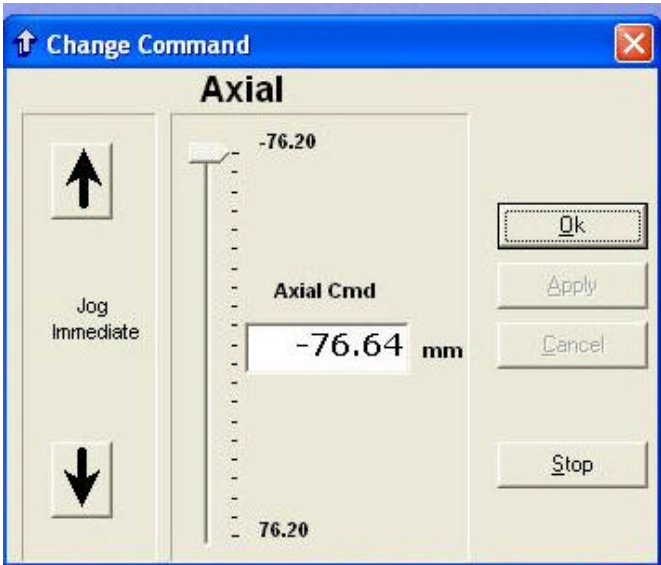


Figure 8 - Change Command Menu.

Selecting the corresponding Jog Intermediate arrow will move the actuator in that direction. The desired position of the actuator may also be typed into the corresponding "Axial Cmd" box and the "Apply" button will make the command active without closing the window.

**NOTE:** In case of emergency, the E-Stop button can be used to shut the system down. The E-Stop button is located on the left column of the load frame.

**2.0 Shut down procedure for MTS single acting frame with UniTest control**  
{tc \11 "1.0 System Introduction}

1. Manually position the moving actuator to its fully lowered position using the Change Command menu (Figure 8).
2. Turn off the HPS using the Hydraulics menu (Figure 7).
3. Exit the UniTest application by clicking on the “X” in the upper right hand corner of the UniTest Main Panel (Figure 6).
4. The computer may be left on at all times other than electrical servicing.
5. Turn the 2 Main Power Panel switches to the OFF position (Figure 1 and 2).\
6. The main power disconnect switch for the pump can be left in the ON position (Figure 3).

### **3.0 High temperature mechanical testing using MTS single actuator frame and Shimadzu thermostatic chamber**

#### **3.1 Structure of the thermostatic chamber**

Figure 9 shows the thermostatic chamber. The main components of the thermostatic chamber are shown schematically in Figure 10. A brief discussion of the function of each of these components as they relate to the operation of the furnace is given below.

1. Test Chamber door (see Figure 10 - #1)

The test chamber door is located in front of the test chamber. The door can be opened or closed when a test jig and specimen are mounted or removed. An observation window is provided at the center of the door.

2. Temperature sensor (see Figure 10 - #2)

Sensor for temperature control.

3. Fan (see Figure 10 - #4)

The fan circulates the air in the test chamber to ensure uniform temperature distribution throughout the chamber.

4. Temperature switch (see Figure 10 - #5)

The temperature switch is activated when the chamber temperature exceeds the upper limit.

5. Rod lid (tray) (see Figure 10 - #6)



Two attachable/detachable rod lid are mounted in the pull rod through holes at the top and bottom of the test chamber. When the pull rods are removed or mounted to the test frame, the rod lids can be removed.

6. Pull rod adapter (see Figure 10 - #7)

The pull rod adapters are thermal insulating adapters that eliminate the gap between the rod and the rod insert hole in the test chamber when the pull rod is mounted. Three types of inner diameters can be selected according to the diameter of the pull rod being used.

7. Chamber illumination lamp (see Figure 10 - #9)

A halogen lamp is used to light up the inside of the chamber.

8. Door switch (see Figure 10 - #10)

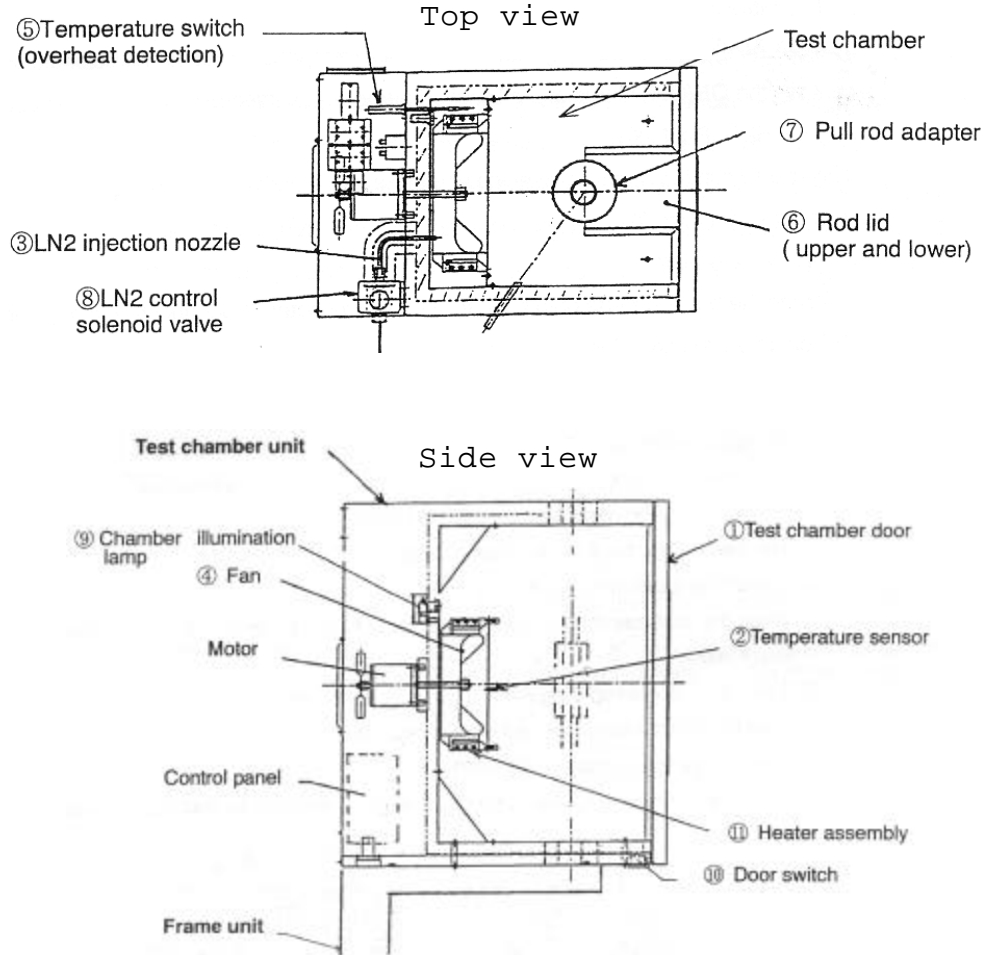
This door switch detects the opening and closing of the chamber door.

9. Heater assembly (see Figure 10 - #11)

The heater assembly incorporates the heating elements. The temperature controller controls the heater.



**Figure 9** – Shimadzu thermostatic chamber.



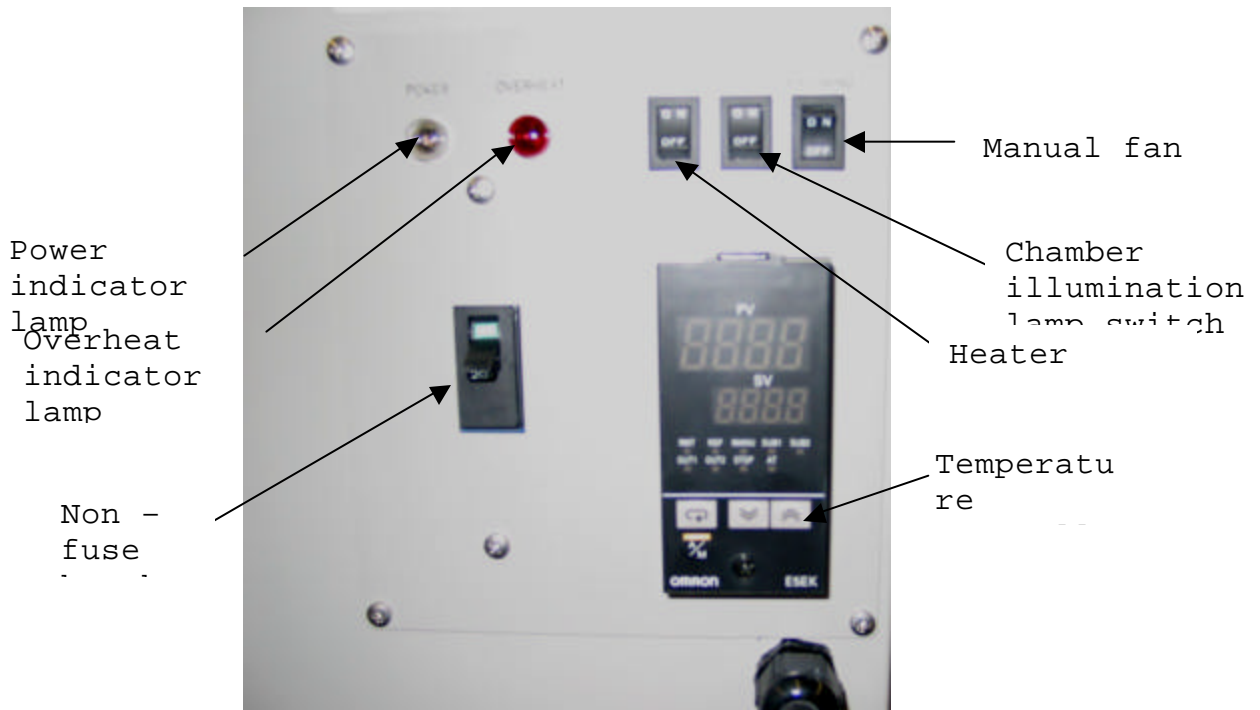
**Figure 10** – Components of the Shimadzu thermostatic chamber.

10. Control panel (see Figure 10 for location and see Figure 11 for exploded view)

- a. Non –fuse breaker – When the breaker turns on/off the system is connected/disconnected from the power supply.
- b. Temperature controller – The temperature controller allows one to set the desired chamber temperature.
- c. Heater switch – This switch turns on/off the heater circuit.
- d. Chamber illumination lamp switch – This switch turns on/off the illumination lamp.
- e. Manual fan switch – When the fan switch is switched to the ON position, it

forces the fan to lower the chamber temperature when the chamber door is opened.

- f. Power indicator lamp – When power is supplied to the chamber, the indicator is light is on.
- g. Overheat indicator lamp – When the temperature inside the chamber exceeds the upper temperature limit, the red indicator turns on.

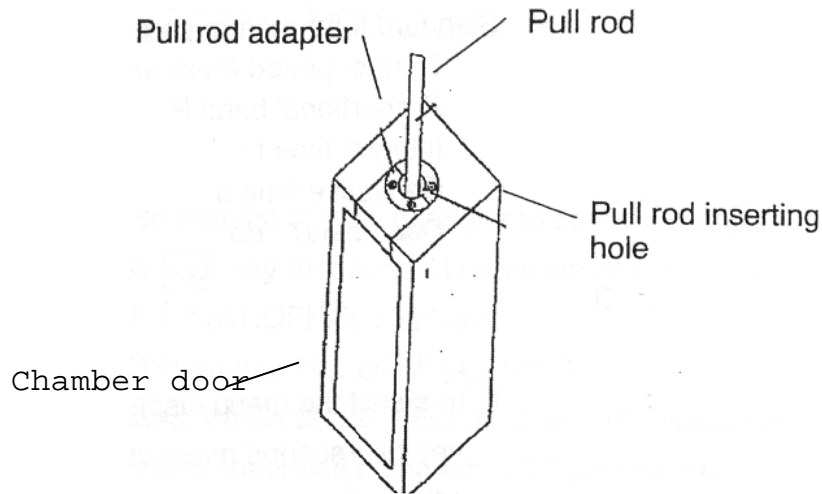


**Figure 11** – Thermostatic chamber control panel.

### 3.2 Installation procedure for thermostatic chamber onto MTS load frame

1. Remove the upper and lower rod lids from the test chamber (refer to Figure 10).
2. Place the thermostatic chamber and the frame on which it is resting on the MTS frame such that center of the rod hole of the thermostatic chamber is laterally and longitudinally aligned with the load center of the testing instrument.
3. Open the chamber door and set-up the testing instrument by mounting the test jig

- (i.e. grips, pull rods) to the testing equipment.
4. Attach the upper and lower rod lids to the original position of the test chamber.
  5. Set the rod adapters in the upper and lower rod inserting holes (Figure 12). Three types of rod adapters are available, which can be selected according to the diameter of the pull rod being used (Figure 12).
  6. It is recommended that a thermal insulating material such as glass wool or ceramic fibre be inserted in between the pull rod and the rod adapter to eliminate the gap between them, and minimize heat loss.
  7. Set the test specimen between the grips and close the chamber door.



**Figure 12** – Pull rod and pull rod adapter.

### **3.3 Start-up procedure for thermostatic chamber**

1. Turn on the power supply for the thermostatic chamber.
2. Turn on the non-fuse breaker (refer to Figure 11 - #1).
3. Set the test temperature on the temperature controller front panel (refer to Figure 13) by the following:
  - a. Select the menu display key for a minimum of 1 second. The word “menu” will be displayed in the No. 1 display box of the control panel.

- b. Select level 0 mode (Lu 0) using the up or down key.
  - c. Press the menu key for a minimum of 1 second to select the level 0 mode.
  - d. Use the up or down key to set the test temperature on the No. 2 display box.
4. Turn on the heater switch (refer to Figure 11 #3). After completion of the above procedure, the heater starts the heating operation.
5. Turn on the chamber illumination lamp by switching on the chamber illumination lamp switch located on the control panel (refer to Figure 11 #4).



**Figure 13** – Temperature controller front panel.

#### **4.0 Shut down procedure for MTS frame and thermostatic chamber**

1. Turn off the heater switch (refer to Figure 11 #3). The power supply to the heater will be stopped, and the chamber temperature will gradually reach the room temperature.
2. Turn off the non-fuse breaker (refer to Figure 11 #1).
3. Turn off the power supply to the thermostatic chamber.
4. Open the thermostatic chamber door and remove the specimen from the grips once the temperature has lowered such that the specimen can be touched with gloves without the chance of scalding.
5. Remove the grips from the upper and lower actuator.
6. Follow the shut down procedure for MTS single acting frame with UniTest control given in Section 2.0.